Planning And Preparation Guide For SAP NetWeaver 7.0: z/OS Implementation:

DB2 V8
DB2 9

Albert D. Rodi

Consulting IT Specialist
IBM Solution Technical Sales
International Business Machines Corporation
1503 LBJ Freeway
Dallas, TX 75234
(972) 280-4791 or TieLine 8-542-4791
E-mail: adrodi@us.ibm.com

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Contents

What is new with SAP Web Application Server 7.0 ?

• The z/OS USS Application Server is no longer supported. However you can install the Central Services on USS as part of a High Availability solution.
• rfcoscol is replaced by sapccmsr and SAPCL
• Transaction ST04 allows monitoring of remote DB2 subsystems
• The mass processing tool to convert indexes to NOT PADDED is available (Transaction DB2_IXFIX)
• Modifications have been made to the PTF Checker Tool
• New DBA Cockpit Monitoring Tool in Basis Support Package 12
• DB2 9 certified July 2007

What is new with SAP Web Application Server 6.40 ?

• DB2 Version 8 is required for the SAP Web AS Release 6.40. Many new features of DB2 V8 are exploited:
  - Table controlled partitioning
  - System level backup and recovery
  - Automatic extent management
  - Accounting and WLM exploitation
  - Transaction level accounting and workload management
  - IFI enhancements
  - Index only access for VARCHAR
• Unicode is now supported.
• DB2 Connect is used to connect non-z/OS application servers to DB2 (enhancements in the tool `db2radm` to setup DB2 Connect). ICLI is no longer used. For the Java stack, the DB2 JDBC Universal Driver is delivered with DB2 Connect and is used for connectivity.
• Stored procedures have replaced the usage of FTP for JCL job submission.
• New features in the planning calendar (transaction DB13)
  - Exploitation of inline statistics and utilities TEMPLATE, MODIFY RECOVERY and MODIFY STATISTICS
  - Protection of changed utility skeletons possible
  - New design
• Recommendations for DB2 V8 system parameters (ZPARMs).
• The SAP Solution Manager must be installed prior to any component installation. This is used to generate a key used during the input phase of the installation.

General Preparation Steps

1. Identify the technical implementation team members:
  z/OS System Programmer
  zLinux Administrator
  Security Administrator
  Unix System Services Administrator
  Storage Administrator
  Network Administrator
  AIX/Windows Administrator
  DB2 DBA
  DB2 Systems Programmer
  R/3 Administrator
  z/OS Capacity Planning & Performance Administrator

2. Available Documentation (SAP):

  - *SAP Planning Guide for SAP NetWeaver for IBM DB2 UDB for z/OS*

  - *Component Installation Guide: SAP ERP 2005 ABAP+Java on AIX: IBM DB2 UDB for z/OS*

  - *Component Installation Guide: SAP ERP 2005 ABAP+Java on Windows: IBM DB2 UDB for z/OS*

  - *Component Installation Guide: SAP ERP 2005 ABAP+Java on Linux: IBM DB2 UDB for z/OS*

  - *SAP ERP 2005 SR1 ASCS+SCS on z/OS: IBM DB2 UDB For z/OS: Installation Guide*

  - *SAP Security Guide for IBM DB2 UDB for z/OS*

  - *SAP Database Administration Guide for SAP NetWeaver on IBM DB2 UDB for z/OS*

  - Master Guide: SAP NetWeaver 2004s

  - Technical Infrastructure Guide: SAP NetWeaver 2004s

  - SAPinst Trouble Shooting Guide for SAP Web AS Java Installation

  - SAP Enterpise Services Architecture and SAP NetWeaver on IBM zSeries : Technology Preview

- Installation of SAP Solution Manager

- Configuration of SAP Solution Manager

- Front End Installation

- Homogeneous and Heterogeneous System Copy for SAP Systems based on NetWeaver 2004s

3. Available Documentation (IBM):
- High Availability for SAP on zSeries Using Autonomic Computing Technologies (SC33- 8206)

- SAP on DB2 UDB for OS/390 and z/OS: Implementing Application Servers On Linux for zSeries (SG24- 6847)

- SAP on IBM DB2 UDB for OS/390 and z/OS: Best Practices for Installing or Migrating to DB2 V8
(websmp202.sap-ag.de/~form/sapnet?_SHORTKEY=01100035870000274486&)

- Tips for Installing DB2 Connect V8 on SAP with DB2 UDB for z/OS V8
(www.ibm.com/support/docview.wss?rs=64&uid=swg27005934)

- SAP on IBM DB2 UDB for z/OS: Best Practices for Installing or Migrating to DB2 9
(service.sap.com/SolutionManagerBP)

- Point-in-time recovery using DB2 V8 for z/OS RESTORE SYSTEM utility and SET LOG SUSPEND

- SAP on DB2 for z/OS and OS/390: High Availability and Performance Monitoring with Data Sharing (SG24-6950)

- SAP on DB2 UDB for OS/390 and z/OS: High Availability Solution Using System Automation (SG24- 6836)

- *SAP R/3 on DB2 UDB for OS/390 and z/OS: Connectivity Guide 5th Edition   (IBM SC33-7965-04)*

- DB2 for z/OS and OS/390: Tools For Performance Management (IBM SG24-6508)

- DB2 for z/OS and OS/390 : Data Management Tools Update (IBM SG24- 6406)

- SAP on DB2 for z/OS and OS/390: DB2 System Cloning

(IBM SG24- 6287)

- DB2 UDB for z/OS V8: Through the Looking Glass and What SAP
  Found There   (IBM SG24- 7088)

- Disaster Recovery with DB2 UDB for z/OS (SG24-6370)

- DB2 Performance Expert for z/OS (SG24-6867)

- DB2 UDB for z/OS Version 8 Technical Preview (SG24-6871)

- Distributed Functions of DB2 for z/OS and OS/390 (SG24-6952)

- SAP on DB2 for z/OS: Multiple Components In One Database(MCOD)
                              (SG24-6914)
- DB2 for z/OS Version 8 : Everything You Ever Wanted to Know...and
                        More   (SG24-6079)
- DB2 9 for z/OS: Performance Topics (SG24-7473)

- Enhancing SAP by Using DB2 9 for z/OS (SG24-7239)

Note: SAP Manuals are available at:

service.sap.com/instguides
service.sap.com/erp-inst
service.sap.com/installNW2004s

IBM Manuals are available at:

www.s390.ibm.com/zos/bkserv

IBM Redbooks are available at:

www.redbooks.ibm.com

3. Plan and conduct a planning session/readiness review for the
 installation and migration (if migrating an existing SAP database).

4. Obtain the required hardware/software plus all necessary PTFs (OSS Note 81737).

5. Important OSS Notes: (service.sap.com/notes)

      660528: Requirements to run SAP NetWeaver on zSeries
      661260: Transports and Support Pac kages for 6.40
      728743: zSeries: Release of DB2 V8 for SAP Components
      746924: Planning information for customers with SAP on zSeries
      606682: High availability and automation solution for Linux zSeries
      563060: DB2/390: Configuring the AppServer on Linux for zSeries
      731937: DB2-z/OS: Customizing DB2 Connect for WebAS 6.20 and DB2 V8
      710466: Upgrade to 6.40 - OS Platforms not supported
      183311: DB2/390: Automated PTF Check
      427748: DB2-z/OS: CCMS corrections (6.10, 6.20, 6.40,7.00)
      943145: DB2-z/OS: Transports and Support Packages for 7.0
      943144: DB2-z/OS: Transports and Support Packages for 7.0
      823245: DB2-z/OS: Transports and Support Packages for 7.0
      858969: SAP NetWeaver 2004s Installation:IBM DB2 UDB for z/OS
      81737:   DB2/390: APAR List
      146289: Parameter Recommendations for 64-Bit SAP Kernel
      138906: DB2/390: Planning Info (release,connectivity matrix)
      103135: DB2/390: Installing saposcol manually
      682077: DB2-z/OS: Premigration checks for DB
      35010:   Service connections: Composite note (overview)
      46902:   Security aspects in remote access
      44864:   SAP Remote Services: Technical preparation
      171356: SAP Software on Linux: Essential Comments
      209384: CCMS Agent Technology
      978817: DB2 for z/OS OEM Package
      805390: SAP Solution Manager is required for SAP Software
      407325:   Released Operating Systems SAP Kernel 6.x/7.x
      852008: Release restrictions for SAP NetWeaver 2004s
      855498: Installation Prerequisite Checker
      856272: SAP Software on UNIX - OS Dependencies NetWeaver 2004s
      855297: SAP ERP 2005 Installation on UNIX
      852235: Release restrictions for SAP ERP 2005
      851251: SAP NetWeaver 2004s Installation on UNIX
      811923: Generating the SAP Solution Manager Key
      848950: SAP NetWeaver 2004s Installation on Windows
      815202: DB2 for z/OS: Upgrade to SAP NW AS 7.0
      611361: Configuring the App Server on Linux for zSeries
      563060: SAP ERP Central Component 5.0 on UNIX
      544623: New Installation of Unicode SAP Systems
      73606:   R/3 Language Combinations (non-Unicode)
      35010: Service Connections:Composite Note
      46902: Security aspects in remote access
      33135:   Guidelines for OSS1
      31515:   Service Connections

797084: SUSE Linux Enterprise Server 9: Installation Note
892818: Application servers on Linux for zSeries: Settings
821904: Separating SCS instances for ABAP and J2EE
686905: DB2 for z/OS: DDIC Corrections (6.40, 7.0)
818291: zSeries: Windows 64 bit app server
144864:   SAP Remote Services: Technical preparation

6. Prepare a project plan for the implementation. The following architecture highlights should be addressed:

- Parallel Sysplex with DB2 Data Sharing Configuration
- SAP Sysplex Failover Scenarios for High Availability
- SAP High Availability Enqueue Instance (Central Services Instance)
- SAP Application Server on zLinux
- Network Connectivity
- Database Backup/Recovery
- Disaster Recovery

7. Prepare a migration plan for submission to SAP if necessary.

8. Setup OSS connection, FTP capability to SAP.

9. Order R/3 Developer Keys if necessary.

10. Generate Backup/Recovery Plan for z/OS, zLinux, AIX, Windows, and the SAP Database.

II   z/OS Hardware Preparation

1. Review Checklist in Installation Manual and at *service.sap.com/platforms* for supported z/OS server models.

2. Determine Hardware Configuration by completing the SAP sizing questionnaire for R/3. Review the sizing deliverable document prepared by the IBM ISV TechLine Sizing Department in conjunction with your IBM Sales Team or implementation partner. Memory estimates will be provided as well. The questionnaire is available online at:
http://www.ibm.com/erp/sizing or by request from eSizings@us.ibm.com.

3. Minimum DASD requirements for new installation are:

       A. Non-Production (65) + (n) 3390-3 volumes

          (60) 3390-3 volumes for SAP data
          (2)   3390-3 volumes for DB2 active logs
          (1)   3390-3 volume for DB2 catalog, directory, BSDS
          (2)   3390-3 volumes for DB2 DSNDB07
          (n)   3390-3 volumes for z/OS datasets(LINKLIB, PROCLIB, etc.)

          (5)   3390-3 volumes for each z/VM LPAR (RES, Spool, Paging)

       B. Each additional Non-Production system (65) 3390-3 volumes

       C. Production (13) + (n) 3390-3 volumes plus (x) volumes for SAP data

          (6) 3390-3 volumes for DB2 active logs
          (3) 3390-3 volumes for DB2 catalog, directory, BSDS
          (4) - (15) 3390-3 volumes for DB2 DSNDB07
          (x) 3390-3 volumes for SAP data (minimum 60 for installation)
          (n) 3390-3 volumes for z/OS datasets

          (5)   3390-3 volumes for each z/VM LPAR (RES, Spool, Paging)

      (plus additional volumes if DB2 logs are archived to DASD)
      (PAV implementation is highly recommended)

z/Linux Application Server for ECC 6.0 (NetWeaver 7.0):

1.2 GB (Temporary installation disk space)
2 x zLinux Guest Memory (Swap Space)
4.3 GB (temporary disk space for every Installation DVD to be copied locally for installation)
13GB (disk space for the SAP filesystems)
8-12GB (Linux)
200MB   (CMS and the Linux boot disk)

4. Define a (400) track VTOC for each DASD volume that will contain DB2 data through ICKDSF DASD initialization. VVDS should be (180) tracks and the VTOC Index should be (50) tracks.Triple these values if the DASD geometry is 3390-9. For 3390-54 geometry use 8,000 tracks for the VTOC, 3600 tracks for the VVDS, and 1000 tracks for the VTOC Index.

5. ICF Catalog Size for DB2 datasets: (50) cylinders primary, (5) cylinders Secondary.

6. 15 MB JES Spool Space.

III   AIX Hardware Preparation

1. Review Checklist in theComponent Installation Guide : SAP ERP 2005 ABAP+Java on AIX: IBM DB2 UDB for z/OS for base Hardware Requirements .

2. Determine Hardware Configuration by completing the SAP sizing questionnaire for R/3. Review the sizing deliverable document prepared by the IBM ISV TechLine Sizing Department in conjunction with your IBM Sales Team or implementation partner. Memory estimates will be provided as well.The questionnaire is available online at:
http://www.ibm.com/erp/sizing or by request from eSizings@us.ibm.com.

3. Minimum required disk space for a standard installation is 20GB, 4.3GB temporary disk space for every DVD to be copied to the local hard disk, plus an additional 1.2GB of temporary disk space.

4. Install GB Ethernet adapter for Gigabit Ethernet connectivity to d atabase.

5. 20GB paging space is required for 64 bit kernels (OSS Note 153641).

IV   z/OS Software Preparation

1. Review Software Checklist in Installation Manual.

REQUIRED
•z/OS 1.6* or higher with the following components installed: UNIX System Services, DFSMS, TCP/IP, LE370, DFSORT
•JES2 or JES3
•z/OS Security Server (RACF V 2.2 or higher) or a similar security function
•z/OS RMF (Resource Management Facility) or another compatible product that supports the Sysplex Data Services (ERBDSQRY, ERBDSREC, ERB2XDGS, ERB3XDRS)
•DB2 UDB for z/OS V8.1 or higher
•Control Center for DB2 UDB for z/OS (FMID JDB881D)
•DB2 Utilities Suite for z/OS
•DB2 Connect V8.1, FixPak 14   or
•DB2 Connect 9 FP 2 Special Build 17586 (APAR IY99846)

*z/OS 1.6 is required for SAP NetWeaver based on WebAS 7.00 - SAP NetWeaver 2004S and SAP components, Business Suite 2005, based on that technology release, but service ended for z/OS 1.6 in September 2007.

HIGHLY RECOMMENDED
•z/OS DFSMSdfp (base element): Provides storage, data, program, and device management functions. Related optional features are :
    •DFSMSdss (optional zOS feature): FlashCopy, volume level dumps and restores
    •DFSMShsm (optional zOS feature): Automated DASD storage management, including space management for low and inactive data. Required for DB2 BACKUP SYSTEM utility.
•z/OS SDSF (Spool Display Search Facility) or equivalent
•z/OS DFSMSrmm (Tape Management) or equivalent
•DB2 Performance Expert (5655-I21) or equivalent
•Tivoli Workload Scheduler for z/OS or equivalent

NICE TO HAVE
•DB2 Automation Tool (5697-G63)
•Tivoli Workload Scheduler for SAP or equivalent

REQUIRED FOR HIGH AVAILABILITY ENQ/SCS SOLUTION
•Tivoli Netview for z/OS (5697-ENV)
•Tivoli Systems Automation for zSeries (5645-006 MLC, 5698-A14 OTC) or equivalent**
•Tivoli Systems Automation for Linux for zSeries (required only if using z/Linux application servers)

**Documentation and sample scripts for TSA are available from IBM. If the customer chooses an equivalent product they take full responsibility for configuring and testing that product with mySAP. High availability solutions are available from a number of providers, the customer is responsible for checking with the provider directly to verify their ability to support mySAP HA scenarios.

REQUIRED FOR zLINUX APPLICATION SERVERS

- SuSE Linux Enterprise Server 10 for zSeries - SLES 10 SP1 (glibc 2.4.31.30, kernel 2.6.16.46-0.12-default) or
- SuSE Linux Enterprise Server 9 for zSeries - SLES 9 SP3 (glibc 2.3.3-98.61, kernel-s390x-2.6.5-7.244)

HIGHLY RECOMMENDED FOR zLINUX APPLICATION SERVERS

- z/VM 5.3 - for running zLinux application servers as VM guests
(If using zLinux Application Servers under z/VM, CPINT is available for download from http://linuxvm.org/Patches/ This product allows for calls back to the hosting /VM system from within the zLinux guest.
- z/VM Performance Toolkit

2. Install all applicable z/OS and DB2 PTFs listed in OSS note 81737.

3. TCP/IP is required as the communication protocol and OSA-Express GbE is strongly recommended as the connectivity type. Review configuration and parameters in the SAP R/3 on DB2 UDB for OS/390 and z/OS: Connectivity Guide.

4. Define the necessary users via RACF definitions (review the SAP Security Guide for IBM DB2 UDB for z/OS):

- define z/OS groupid <SCHEMA> as this will be the creator of all DB2 objects
  (Default = SAPR3)
- define R/3 installation userid (superuser) for z/OS (zLinux uses linux root user)
- define userid <sid>adm and groupid SAPSYS to run z/OS System Central
  Services (zLinux uses linux user <sid>adm and linux group sapsys)
- define DB2 Connect Userid (for Java it is sap<sid>db, it is recommended that
  the user be created without a TSO segment and without an expiration date)
- define userid with DB2 SYSADM authority for installation tasks (only needed for
  installation)
- define superuser to start SAPOSCOL and SAPCCMSR under USS

Review the SAP Security Guide for all of the necessary security settings for DB2.

5. Test FTP and job submission between the application server and z/OS using the DB2 SYSADM userid created above in step 4. *** Pre-Install Check***

6. Setup UNIX System Services parameters by modifying SYS1.PARMLIB(BPXPARMxx) , including the Physical File System definition for the TCP/IP communication protocol stack. Integrated INET is recommended over Common INET. See Sample BPXPRMxx in Section X. SAP Central Services can run under USS as well as the programs saposcol and sapccmsr.

7. z/OS no longer supports compatibility mode dispatching priorities. A WLM Goal Mode configuration is required , in particular for the DDF workload since that is where the SAP enclaves will be created via the DB2 DDF address space. The WLM configuration and setup is described in the SAP Planning Guide for SAP NetWeaver for IBM DB2 UDB for z/OS.WLM Workload attributes include: SAP work process type (dialog, batch, update, etc.), <SID>, host name, ABAP Report, and transaction code.

8. Place the JES Scheduler Work Area (SWA) above the 16MB line:
        JES2 - SWA=ABOVE on JOBCLASS(STC)
                in SYS1.PARMLIB(JES2PARM)

        JES3 - Initialization parameter CIPARM (Converter/Interpreter
                Parameter List) defined to place SWA above the line.

9. Configure the TCP/IP protocol for GB Ethernet:

A. Define the z/OS I/O configuration for the OSA-ExpressCard:
- Define channel path ID for OSA-Express channel with type=OSA
- Define OSA-Express control unit with type=OSA
- Define 2 OSA-Express devices
- Define Unit Addresses for the Control Unit
(2 Devices for LCS (D118,D119)
B. Customize the OSA-Express Feature through OSA/SF or TSO.
C. Configure the MPC interface using the DEVICE, LINK, HOME,
GATEWAY, and START statements in the TCP/IP Profile Dataset. Jumbo
frames are recommended if network hardware supports it (MTU = 8992).
D. Configure the AIX or NT network connection.
E. Test the connection using ping or oping. *** Pre-Install Check***

10. Test the TCP/IP configuration using the TCP/IP HOMETEST facility. This looks for errors in the configuration.
* Pre-Install Check*

11. Setup the RRS subsystem and monoplex environment **.** DB2 Stored Procedures used by SAP exploit the RRS Attach Facility. Configure a DASD only logstream if running in a monoplex mode. Allocate Coupling Datasets and System Logger datasets.

12. Review the Pre-Installation Activities and Administration Chapters (3 and 4) in the SAP Planning Guide for SAP NetWeaver for IBM DB2 UDB for z/OS.

13. Cache the DB2 User Catalog (catalogs the SAP tablespaces and indexspaces) in a Data Space accessed through VLF. To do this add the following to the COFVLFxx parmlib member:

        CLASS NAME(IGGCAS)
                EMAJ(name of user catalog dataset)

14. Switch off unnecessary traces. Activate SMF type 70-79 and 100-102 records.

15. Use the IBM Health Checker for z/OS and Sysplex Tool. The IBM Health Checker for z/OS and Sysplex is a tool that checks the current active z/OS and sysplex settings and definitions for an image and compares their values to those either suggested by IBM or defined by you, as your criteria. The objective of the IBM Health Checker for z/OS and Sysplex is to identify potential problems before they impact your availability, or in worst cases, cause outages. This tool runs on all z/OS releases.
It is available at www.ibm.com/servers/eserver/zseries/zos/downloads and is a part of the base release as of z/OS 1.7 .

16. After the SAP installation is complete setup and install the SAP Operating System Collector saposcol , the CCMS agent SAPCCMSR, and the SAP DB2 Stored Procedure

SAPCL as per Chapter 4 of the SAP Planning Guide for SAP NetWeaver for IBM DB2 UDB for z/OS. These processes run under Unix System Services (USS).

17. For z/OS V1.7 and z/OSe V1.7: If the SAP implementation will exploit the IBM System z9 Integrated Information Processor(zIIP), this requires the "IBM System z9 Integrated Information Processor Support for z/OS and z/OSe Web Deliverable, available on the z/OS downloads website plus PTFs.

This Web deliverable contains FMID JBB772S for z/OS and z/OS.e V1.7:

Http://www-03.ibm.com/servers/eserver/zseries/zos/downloads/

Install the service identified in the program directory that comes with this Web deliverable and the recommended service in the appropriate ZOSV1Rn BCPZIIP PSP bucket. IBM DB2 UDB for z/OS V8 with PTFs, is also required for exploitation for portions of eligible workloads. See Flash10477 on the Techdocs website for more information. For z/OS and z/OS.e V1.8 this Web deliverable is not needed.

V DB2 Preparation

1. Install DB2 subsystem. A separate ICF catalog is recommended for each DB2 subsystem based on the High Level Qualifier for DB2 datasets. the ICF Catalog should contain only the catalogued objects for a single DB2 subsystem. However, with DB2 V8 and DB2 9 the recommendation is to have two ICF Catalogs, one for each Copy Pool. There is a DataBase Copy Pool, that will contain the SAP tablespaces, SAP indexspaces, DB2 Catalog, and DB2 Directory. There is also a Log Copy Pool that will contain the Active Log Datasets and the BSDS Datasets. The reason for this separation is that during a RESTORE SYSTEM only the DataBase Copy Pool will be restored to DASD, not the Log Copy Pool, and we do not want the ICF Catalog containing the Logs and BSDS restored. This is explained in Chapter 7 of the redbook SG24-7088.
Review all of the setup information in Chapter 3 of the SAP Database Administration Guide for SAP NetWeaver on IBM DB2 UDB for z/OS.
This chapter describes in detail the setup activities such as RRS, Stored Procedure Setup, and z/OS Unicode Conversion Services.

2. Apply all recommended PTFs from OSS Note 81737.

3. Modify group attach name in SYS1.PARMLIB(IEFSSNxx) if using data sharing. The recommendation is to use the SAP SID for the group attach name, and the SAP SID followed by a member number for each DB2 member within the group. See the recommended naming conventions in Section XIV.

4. Configure DB2 active log datasets and DSNDB07:
   - for a nonproduction system (3) log datasets @ 1000 3390-3 cylinders each for LOGCOPY1 and LOGCOPY2 minimum on separate volumes

   - for a production system (6) volumes are recommended for active log datasets (one dataset per volume)

   - for installation disable archiving with the hidden zparm OFFLOAD=NO and use (6) volumes for active log datasets (one dataset per volume)

   - place active log datasets and BSDS datasets on separate controllers for maximum availability

   - recommended production initial definitions for DSNDB07 for a large installation (each should be on a separate volume, ~1300 logged in users) :
       (7) 4K TableSpaces @ 660 cylinders each
       (5) 4K TableSpaces @ 500 cylinders each
       (3) 32K TableSpaces @ 185 cylinders each , Total = 7675 cylinders

- recommended production initial definitions for DSNDB07 for an initial installation (each should be on a separate volume)：
>
>   (4) 4K TableSpaces @ 200 cylinders each
>   (2) 32K TableSpaces @ 200 cylinders each , Total = 1200 cylinders

5. Define archive log environment. If archiving to DASD, create a SMS storage group and configure enough DASD to maintain enough archives between HSM migrations. Develop and implement a HSM migration strategy. If archiving to tape then set ARCWTOR=NO and ensure that tapes are available via a loader. The installation will require at least 30 GB of archive space. There will be approximately 40 log archives during the load phase of the installation. Another option is to use a hidden DB2 ZPARM. Setting OFFLOAD=NO will disable DB2 archive processing for the installation. This should be removed after the installation.

6. Set DSNZPARMS , DSNTIPD installation panel values, and Buffer Pool Parameters as per the SAP Database Administration Guide for SAP NetWeaver on IBM DB2 UDB for z/OS. OSS Note 1032273 addresses the ZPARM recommendations for DB2 9.

7. Install and Enable WLM Stored Procedures support as described in Chapter 3 of the SAP Database Administration Guide for SAP NetWeaver on IBM DB2 UDB for z/OS. SAP uses WLM established address spaces for DB2 Stored Procedures. WLM dynamically creates and deletes address spaces and manages the work and the number of address spaces according to a defined goal.

8. Set IRLM Parameters in the JCL: (use REGION=0M) **(Watch for IEFUSI exit limit)**
>   PC=YES (use IRLM Private Storage Area),
>   MLMT=4,
>   MAXCSA=0
>   DEADLOK=5,1
>   SCOPE=LOCAL (GLOBAL if DB2 Data Sharing is being used)

The PC and MAXCSA parameters are no longer used, but you must maintain them for compatibility reasons. You must specify the parameters and values, but their values are not used. DB2 V8 and DB2 9 require IRLM 2.2, which is delivered with DB2 V8 and DB2 9. You must use the DB2–supplied IRLM procedure. To modify an existing IRLM procedure for use with IRLM, you must do the following:
•Add the MLMT (MEMLIMIT) parameter with the appropriate setting.
•Specify YES for the PC parameter.
•Specify 0 for the MAXCSA parameter.

9. Install Real Time Statistics and Stored Procedure DSNACCOR as described in Chapter 3 of the SAP Database Administration Guide for SAP NetWeaver on IBM DB2 UDB for z/OS.

10. Install the Control Center Stored Procedures required by SAP as described in described in Chapter 3 of the SAP Database Administration Guide for SAP NetWeaver on IBM DB2 UDB for z/OS. The procedures are used for Database administration and replace the FTP submission of JCL streams used in previous releases.

11. Define <SCHEMA> as a secondary authorization ID of the DB2 Connect userid. To do this replace the default secondary exit routine as described in section 3.4.2.2 of the IBM DB2 V8 Administration Guide or Appendix A of the DB2 9 Administration Guide. Use the sample exit routine provided to use the RACF group name <SCHEMA> as a DB2 secondary ID. This is setup through DB2 installation job DSNTIJEX. SAPR3 is the default schema.

12. Setup the DB2 DDF environment as described in Chapter 3 of the SAP Database Administration Guide for SAP NetWeaver on IBM DB2 UDB for z/OS.

13. Install DB2 Connect V8.1, Fixpak 12 on each application server (except for z/OS application servers). Create a 64 bit instance and reference OSS Note 731937 and the document Tips for Installing DB2 Connect V8 on SAP with DB2 UDB for z/OS V8 for SAP customization information. Test the connection to DB2 using the 'db2 connect' command.

<div align="center">OR</div>

Install the DB2 Connect V9 CLI Driver. The information on how to complete this installation is contained in OSS Note 1031213.

14. Initialize ECSA and ESQA so that the DBM1 address space is allowed 1800MB of extended private region.

15. Establish and test DB2 Backup/Recovery Procedures. These procedures should include a combination of DB2 and non-DB2 utilities in order to handle various recovery scenarios. In addition, DB2 V8 provides two new utilities for providing DB2 controlled system wide backup and a point in time recovery. These are the BACKUP SYSTEM and RESTORE SYSTEM (See OSS note **83000**).

In addition, with DB2 V8 and DB2 9 you can leverage the RESTORE SYSTEM utility for point-in-time recovery processes. It is not necessary to use the BACKUP SYSTEM utility in obtaining the system level copy in order to leverage the benefits of a total system level recovery using the RESTORE SYSTEM utility. The system level copy can be obtained using the volume level copy technology of your DASD, along with a SET LOG SUSPEND. With the RESTORE SYSTEM utility the complexity of point-in-time recovery is greatly reduced, providing a process that can be accomplished in a couple of hours.

Recommended initial backup procedure:

Weekly ------> 1. Full DB2 Image Copy Of All R/3 Tablespaces
        (SHRLEVEL=CHANGE or REFERENCE)
        (2 copies - one for offsite)
        (Perform a dynamic build of COPY utility JCL and
         Control statements)

Daily ---------> 2. Full Image Copy of DB2 Catalog/Directory
        (SHRLEVEL=REFERENCE)
        (2 copies - one for offsite)
       3. Issue DB2 command ARCHIVE LOG MODE(QUIESCE)
        to establish point of consistency RBA

Daily ------> 1. FlashCopies of DB2 Volumes using DB2
        SUSPEND LOG command or DB2 V8 BACKUP
        SYSTEM

Note: DB2 SUSPEND LOG command performs the following actions:

- suspends log writes
- flushes log records to DASD
- records high log RBA in BSDS
- queues updates
- creates a point of consistency identified by a LOG RBA
- bufferpools are not flushed (it is not a checkpoint)
- allows a normal DB2 restart to obtain a consistent database (transactions in flight are rolled back)

16. The recommendation is to develop a DB2 system libraries configuration that allows each DB2 subsystem to be migrated to a new level of DB2, or DB2 maintenance, individually. For instance, if this is a DB2 data sharing group, you want to migrate members one at a time. The system libraries include SDSNLOAD, SDSNEXIT, SDSNMACS, SDSNSPFP, etc. The RUNLIB.LOAD, DBRMLIB.DATA and SRCLIB. DATA libraries are groups level libraries and are changed when the first data sharing member is migrated to a new DB2 version or maintenance level.

This can be accomplished two ways:
1. Each DB2 subsystem, or data sharing member has their own set of system libraries, and when maintenance, or migration to a new level of DB2 takes place.the new SMP/E libraries are copied into the system libraries of the DB2 subsystem being updated.
2. Maintain a N and a N+1 copy of the system libraries. In this case, the PROCs for the DB2 subsystem that is being updated would be changed to point to the N+1 level of system libraries. You would still maintain separate SDSNEXIT libraries for each subsystem or data sharing member.

17. Review DB2 virtual storage considerations in Chapter 5 of the SAP Database Administration Guide for SAP NetWeaver on IBM DB2 UDB for z/OS. It is important to follow the guidelines on estimating the use of virtual storage below the 2GB bar because in DB2 V8 there are memory structures that exist below this bar. For DB2 9 the procedure for estimating virtual storage requirements nelow the 2GB bar is described in the document 'SAP on IBM DB2 for z/OS: Best Practice for Installing or Migrating to DB2 9'.

18. For Online Reorg use normal SHRLEVEL CHANGE parameters plus the following:
    MAXRO 10   (maximum time for last iteration)
    TIMEOUT TERM (if utility times out then terminate)
    DRAIN ALL   (readers and writers during final phase , prevents deadlocks)
    LONGLOG DRAIN DELAY 0
    DRAIN_WAIT 120
    RETRY 10
    RETRY_DELAY 120

VI DB2 Related OSS Notes

1043951: Release of DB2 9 for SAP components
1072066: DBA Cockpit: New function for DB Monitoring
1027452: DB2 z/OS CCMS: DBA Cockpit
746299: Recommended Settings for Linux for zSeries JVM
1022334: DB2 z/OS Loading a table with compression dictionary
1032273: DB2 z/OS: Configuring DB2 9
913109: DB2 z/OS: SAPCL Patch Collection
686905: DB2 z/OS: DDIC Corrections (6.40, 7.0, 7.10)
955047: DB2 z/OS: History of statement cache statistics in ST04
1031213: DB2 z/OS: Customizing V9 CLI Driver
815202: DB2 z/OS: Upgrade to NetWeaver 7.0
682077   PreMigration Checks for DB2 V8
726215   Upgrade to ECC 5.0 - free space
731937   Customizing DB2 Connect for Web AS 6.20 and DB2 V8
761520   DDLOG overflow - DB2 parameter NUMLKUS too small
728743   Release of DB2 V8 for SAP components
138906   DB2 Planning Information
765983   Reducing number of DSNACCOR reorgs
660528   Requirements to run SAP NetWeaver on zSeries
717935   FTP replacement by Stored Procedures
82953   Bufferpool Tuning
958252   SAPCL FAQ
26317   LOGON Group for Load Balancing
38119   SAPLOGON Administration
184399   Creating VBDATA in 4K Tablespace
116698   Optimizing Access to Tables VBHDR, VBMOD, VBDATA
109515   Update Groups for Asynchronous Updates
162923   Planning and Monitoring Virtual Storage
153073   Failover to Standby DB2 in Same LPAR
113008   Maintaining Catalog Statistics
355213   DB2 Lock Escalations
363189   Volume Copy Consistency
81737   PTF Maintenance
132424   TRFC, QRFC Access
192320   NPGTHRSH Parameter
129385   ABAP Clauses Values
173547   SMF Parameter DDCONS
183311   Automated PTF Check
394037   Deadlock Reduction
70964   DB2 Performance Parameters
386355   TRAP Parameter in LE
426863   DB2 Performance Monitor/IFI Data Collector
101217   Overview of Transports and Corrections
509738   Indexes on Catalog Tables

509529   DB2 Changing the DB Host
513750   DB2 Data Sharing Topology
390016   DB2/390 BW: DB Settings and Performance
758550   DB2 System Parameter Check (DB16)
686905   History of statement cache statistics in ST04
956517   DB2 for z/OS: Load of alert router fails
846145   DB2 for z/OS: saving space when you load using R3load
908770   DB2 for z/OS: SAP Java performance optimizer
958252   SAPCL FAQ
930025   Stored Procedure SAPCL configuration problem
915482   DB2 for z/OS: Automating DB failover

VII   AIX Software Preparation

1. Review Checklist in the Installation Guide: SAP ERP 2005 ABAB+Java on AIX: IBM DB2 UDB for z/OS for base Software Requirements.

HIGHLY RECOMMENDED FOR AIX APPLICATION SERVERS
•AIX Performance Toolbox and Performance AIDE for POWER Version 3.0

2. Apply all recommended PTFs as per OSS note 81737.

3.Configure the GbE adapter for the GbE LAN.

4. Reboot AIX and verify z/OS TCP/IP connections:

          - ping the TCP z/OS hostname   *** Pre-Install Check***

VIII Windows Hardware/Software Preparation

1. Review Checklist in Component Installation Guide: SAP ERP 2005 SR1 ABAP+Java

on Windows:IBM DB2 UDB for z/OS for base Software Requirements.

2. Certified Hardware is required for application servers. Current certified IBM
models are:
> IBM eServer xSeries
> IBM BladeCenter Servers

3. 3 GB RAM minimum (use sizing configuration recommendation)

4. Disk space requirements are in the manual SAP ERP 2005 SR1 ABAP+Java on
Windows: IBM DB2 UDB for z/OS manual.

5. Virtual Memory =   1X RAM + 8GB (see OSS Note 153641)

6. CD Drive

7. LAN connection to z/OS OSA-Express

8. English International Version of one of:
> - Windows Server 2003 Standard Edition
> - Windows Server 2003 Enterprise Edition
> - Windows Server 2003 Datacenter Edition

9.DB2 Connect

10. Windows Resource Kit is highly recommended.

11. If installing in a mixed environment (i.e. with AIX application servers) you will
need software such as SAMBA in order to share filesystems using SMB protocol.

12. Operating System preparation steps are documented in Chapter 3 of the SAP ERP
2005 SR1 ABAP+Java on Windows: IBM DB2 UDB for z/OS manual.

13. Network Configuration

14. Prepare printers (if required)

15. Ping the TCP z/OS hostname   *** Pre-Install Check***

IX   SAP Installation Preparation

1. Order SAP Installation Kit.

2. Build project plan for installation.

3. Setup OSS connection to SAP and test FTP capability to sapserv.
* Pre-Install Check*

4. Obtain all necessary OSS notes.

5. Gather the information necessary to respond to the SAPinst system parameters required for the installation. These are documented in the Component Installation Guides, Chapter 2.

X   Sample BPXPRMxx Member

```
MAXPROCSYS(4096)
MAXPROCUSER(200)
MAXTHREADTASKS(1000)
MAXTHREADS(1000)
MAXUIDS(200)
MAXFILEPROC(2000)
MAXFILESIZE (omit)
MAXPTYS(256)
CTRACE(CTIBPX00)
IPCMSGQMNUM(20000)
IPCMSGQBYTES(1048576)
IPCSHMSPAGES(786432)
IPCSHMMPAGES(524287)
IPCSHMNSEGS(100)
IPCSEMNIDS(4096)
IPCSHMNIDS(4096)
IPCSEMNSEMS(32767)
IPCSEMNOPS(32767)
MAXMMAPAREA(4096)
MAXCORESIZE(2147483647)
MAXASSIZE(2147483647)
MAXCPUTIME(2147483647)
MAXSHAREPAGES(131072)
USERALIASTABLE(/etc/ualiastable)
FORKCOPY(COW)
```

```
FILESYSTYPE TYPE(HFS) ENTRYPOINT(GFUAINIT)

ROOT FILESYSTEM('OMVS.ROOT') TYPE(HFS) MODE(RDWR) PARM('')


MOUNT FILESYSTEM('OMVS.SAP.<SID>') TYPE(HFS) MODE(RDWR)
      MOUNTPOINT('/sap/<sid>')


MOUNT FILESYSTEM('OMVS.TMP') TYPE(HFS) MODE(RDWR)
      MOUNTPOINT('/tmp')


FILESYSTYPE TYPE(IBMUDS)
   ENTRYPOINT(BPXTUINT)
NETWORK DOMAINNAME(AF_UNIX)
   DOMAINNUMBER(1)
   MAXSOCKETS(2000)
   TYPE(IBMUDS)


/* AF_INET Transport for TCP/IP */

FILESYSTYPE TYPE(INET) ENTRYPOINT(EZBPFINI)
 NETWORK DOMAINNAME(AF_INET)
       DOMAINNUMBER(2)
       MAXSOCKETS(25000)
       TYPE(INET)

 /* End of TCP/IP */

                    OR

/* Common INET Transport for TCP/IP */

FILESYSTYPE TYPE(CINET) ENTRYPOINT(BPXTCINT)
SUBFILESYSTYPE NAME(TCPIP) TYPE(CINET)
       ENTRYPOINT(EZBPFINI) DEFAULT
SUBFILESYSTYPE NAME(OESTACK) TYPE(CINET)
       ENTRYPOINT(BPXUIINT)
NETWORK DOMAINNAME(AF_INET) DOMAINNUMBER(2)
       MAXSOCKETS(25000) TYPE(CINET)
       INADDRANYPORT(5000) INADDRANYCOUNT(1000)

/* End of TCP/IP */
```

XI   Sample DB2 DSNZPARMS

DB2 V8
* = required/recommended value for SAP

```
DSN6ENV   MVS=XA
DSN6SPRM  RESTART,
          ALL,
          ABEXP=YES,
          ABIND=YES,
          AUTH=YES,
          AUTHCACH=4096,
          BINDNV=BINDADD,
          BMPTOUT=0,
        * CACHEDYN=YES,
        * CACHEDYN_FREELOCAL=1, (APAR PK21861)
          CACHEPAC=1048576,
          CATALOG=DNX1SYS,
        * CDSSREF=1,
          CHGDC=NO,
        * CONTSTOR=YES,
          DECDIV3=NO,
          DEFLTID=IBMUSER,
          DESCSTAT=YES,
          DLITOUT=0,
        * DSMAX=6000,
        * EDMSTMTC=300000,
          EDPROP=NO,
          EXTSEC=NO,
        * EVALUNC=YES,
          HOPAUTH=YES,
          IRLMAUT=YES,
          IRLMPRC=<SID>IRLM,
          IRLMSID=INX1,
        * IRLMRWT=600,
        * IRLMSWT=300,
        * LRDRTHLD=10,
        * MAXRBLK=100000,
        * MAXKEEPD=8000,
        * MINSTOR=YES,
        * NPGTHRSH=10,
        * NUMLKTS=1000000,
        * NUMLKUS=500000(nonproduction),2097152(production)
        * PADIX=NO, (OSS Note 793204)
        * PARTKEYU=YES,
```

```
              RECALL=YES,
              RECALLD=120,
       *      RELCURHL=YES,
       *      RETLWAIT=1, (Data Sharing only)
              RGFCOLID=DSNRGCOL,
        *     RETVLCFK=NO,
              RGFDBNAM=DSNRGFDB,
              RGFDEDPL=NO,
              RGFDEFLT=ACCEPT,
              RGFESCP=,
              RGFFULLQ=YES,
              RGFINSTL=NO,
              RGFNMORT=DSN_REGISTER_OBJT,
              RGFNMPRT=DSN_REGISTER_APPL,
       *      RRULOCK=NO,
       *      SEQCACH=SEQ,
              SEQPRES=YES,
              SITETYP=LOCALSITE,
       *      SJMXPOOL=128,
       *      SRTPOOL=28000,
       *      STARJOIN=2,
       *      SJTABLES=4,
       *      SJMXPOOL=128,
       *      STATSINT=30,
              SYSADM=SYSADM,
              SYSADM2=P47208,
              SYSOPR1=SYSOPR,
              SYSOPR2=P47208,
       *      UTIMOUT=3,
       *      XLKUPDLT=TARGET
DSN6ARVP  ALCUNIT=TRK, (CYL)
              ARCWRTC=(1,3,4,11),
        *     ARCWTOR=NO,
              ARCPFX1=DNX1SYS.ARCHLOG1,
              ARCPFX2=DNX1SYS.ARCHLOG2,
              ARCRETN=90,
              BLKSIZE=28672(Tape) or 20480(3380) or 24576(3390/RVA),
              CATALOG=YES,
              COMPACT=YES,
              PRIQTY=32768, (850)
              PROTECT=NO,
        *     QUIESCE=585,
              SECQTY=100,
              TSTAMP=YES,
              UNIT=CART,
              UNIT2=CART
```

```
DSN6LOGP  DEALLCT=(1440),
          MAXARCH=500,
          MAXRTU=2,
     *    OUTBUFF=4000,
     *    TWOACTV=YES,
     *    TWOARCH=YES



DSN6SYSP  AUDITST=NO,
     *    ACCUMACC=5,
     *    CHKFREQ=10,
          CONDBAT=64, (>= MAXDBAT)
     *    CTHREAD=1900, (sum of TSO users + IDBACK)
          DLDFREQ=5,
     *    IDBACK=1800, 1.3 * (number of all SAP work processes+
                      RFCOSCOL alert threads*2)
          IDFORE=60,
     *    LBACKOUT=NO,
     *    LOGAPSTG=100,
     *    LOBVALA=1000000,
     *    LOBVALS=50000,
          MAXDBAT=64, 1.3 * (number of all SAP work processes)
     *    MGEXTSZ=YES,
          MON=YES,
     *    MONSIZE=500000,
     *    PCLOSET=25,
     *    PCLOSEN=15,
          RLF=NO,
          RLFTBL=01,
          RLFERR=NOLIMIT,
          RLFAUTH=SYSIBM,
          ROUTCDE=(1,3,4,11),
     *    SMFACCT=(1,2,3),
     *    SMFSTAT=(1,3,6),
          STATIME=30,
          STORMXAB=5,
          STORTIME=180,
     *    SYNCVAL=30,
          TRACSTR=NO,
          TRACTBL=16,
     *    URLGWTH=100,
     *    URCHKTH=1

DSN6FAC * DDF=AUTO,
        * CMTSTAT=INACTIVE,
```

```
            *   IDTHTOIN=0,
                RESYNC=2,
                RLFERRD=NOLIMIT,
                TCPALVER=YES
      DSN6GRP   DSHARE=NO,
                GRPNAME=S4A,
                MEMBNAME=DNX1,
                COORDNTR=NO,
                ASSIST=NO
      END
DSNHDECM CHARSET=ALPHANUM,
         *      ASCCSID=819,
                AMCCSID=65534,
                AGCCSID=65534,
         *      APPENSCH=EBCDIC,
         *      SCCSID=37,  ( or any value where DB2 supports translation
                            between SCCSID and ASCCSID, do not use 500)
                MCCSID=65534,
                GCCSID=65534,
         *      ENSCHEME=ASCII,
                DATE=ISO,
                DATELEN=0,
         *      DECARTH=DEC15,
         *      DECIMAL=PERIOD,
                DEFLANG=C,
                DELIM=DEFAULT,
                MIXED=NO,
                SQLDELI=DEFAULT,
                DSQLDELI=APOST,
                SSID=DNX1,
                STDSQL=NO,
                TIME=ISO,
                TIMELEN=0
      END
```

DB2 9
* = required/recommended value for SAP

```
DSN6ENV   MVS=XA
DSN6SPRM  RESTART,
          ALL,
          ABEXP=YES,
          ABIND=YES,
          AUTH=YES,
          AUTHCACH=4096,
          BINDNV=BINDADD,
          BMPTOUT=0,
     *    CACHEDYN=YES,
     *    CACHEDYN_FREELOCAL=1,
          CACHEPAC=1048576,
          CATALOG=DNX1SYS,
     *    CDSSREF=1,
          CHGDC=NO,
     *    CONTSTOR=YES,
          DECDIV3=NO,
          DEFLTID=IBMUSER,
          DESCSTAT=YES,
          DLITOUT=0,
     *    DSMAX=20000,
     *    EDMDBDC=value presented by DB2 install CLIST, min 150MB
     *    EDMSTMTC=300000,
     *    EDMPOOL = value presented by DB2 install CLIST, min 64MB
          EDPROP=NO,
          EXTSEC=NO,
     *    EVALUNC=YES,
          HOPAUTH=YES,
          IRLMAUT=YES,
          IRLMPRC=<SID>IRLM,
          IRLMSID=INX1,
     *    IRLMRWT=600,
     *    IRLMSWT=300,
     *    LRDRTHLD=10,
     *    MAXRBLK=100000,
     *    MAXKEEPD=8000,
     *    MINSTOR=YES,
     *    MXDTCACH=128,
     *    NPGTHRSH=10,
     *    NUMLKTS=1000000,
     *    NUMLKUS=500000(nonproduction),2097152(production)
     *    PADIX=NO, (OSS Note 793204)
     *    PARAMDEG=number of CPUs,
```

```
        *    PARTKEYU=YES,
             RECALL=YES,
             RECALLD=120,
        *    RETLWAIT=1, (Data Sharing only)
             RGFCOLID=DSNRGCOL,
        *    RETVLCFK=NO,
             RGFDBNAM=DSNRGFDB,
             RGFDEDPL=NO,
             RGFDEFLT=ACCEPT,
             RGFESCP=,
             RGFFULLQ=YES,
             RGFINSTL=NO,
             RGFNMORT=DSN_REGISTER_OBJT,
             RGFNMPRT=DSN_REGISTER_APPL,
        *    RRULOCK=NO,
        *    SEQCACH=SEQ,
             SEQPRES=YES,
             SITETYP=LOCALSITE,
        *    SJMXPOOL=128,
        *    SRTPOOL=28000, (64000 for BI)
        *    STARJOIN=2,
        *    SJTABLES=4,
        *    SJMXPOOL=128,
        *    STATROLL=YES,
        *    STATSINT=30,
             SYSADM=SYSADM,
             SYSADM2=P47208,
             SYSOPR1=SYSOPR,
             SYSOPR2=P47208,
        *    SYSTEM_LEVEL_BACKUPS=YES,
        *    TABLES_JOINED_THRESHOLD=10,
        *    UTIMOUT=3,
        *    XLKUPDLT=TARGET
DSN6ARVP  ALCUNIT=TRK, (CYL)
             ARCWRTC=(1,3,4,11),
        *    ARCWTOR=NO,
             ARCPFX1=DNX1SYS.ARCHLOG1,
             ARCPFX2=DNX1SYS.ARCHLOG2,
             ARCRETN=90,
             BLKSIZE=28672(Tape) or 20480(3380) or 24576(3390/RVA),
             CATALOG=YES,
             COMPACT=YES,
             PRIQTY=32768, (850)
             PROTECT=NO,
        *    QUIESCE=585,
             SECQTY=100,
```

```
                  TSTAMP=YES,
                  UNIT=CART,
                  UNIT2=CART
      DSN6LOGP  DEALLCT=(1440),
                  MAXARCH=500,
                  MAXRTU=2,
            *     OUTBUFF=4000,
            *     TWOACTV=YES,
            *     TWOARCH=YES



DSN6SYSP  AUDITST=NO,
            *     ACCUMACC=5,
            *     ACCUMUID=11,
            *     CHKFREQ=2,
                  CONDBAT=64, (>= MAXDBAT)
            *     CTHREAD=200, (sum of TSO users + IDBACK)
                  DLDFREQ=5,
            *     IDBACK=50,  (>=20 and at least1.3 times the sum of: ICLI work
                                    processes + z/OS work processes +
                                        alert  router threads of rfcoscol or SAPCL)
                  IDFORE=60,
            *     IDXBPOOL=BP3,
            *     IMPDSDEF=NO,
            *     IMPTSCMP=YES,
            *     IXQTY=720,
            *     LBACKOUT=NO,
            *     LOGAPSTG=100,
            *     LOBVALA=1GB,
            *     LOBVALS=50GB,
                  MAXDBAT=200,  (>=100 and at least 1.3 times the sum of: SAP
                                    work processes that use DB2 Connect +
                                    secondary connections that use DB2 Connect)
            *     MGEXTSZ=YES,
                  MON=YES,
            *     MONSIZE=500000,
            *     PCLOSET=25,
            *     PCLOSEN=15,
                  RLF=NO,
                  RLFTBL=01,
                  RLFERR=NOLIMIT,
                  RLFAUTH=SYSIBM,
                  ROUTCDE=(1,3,4,11),
            *     SMFACCT=(1,2,3),
            *     SMFSTAT=(1,3,6),
```

```
                    STATIME=30,
                    STORMXAB=5,
                    STORTIME=180,
            *       SYNCVAL=30,
                    TRACSTR=NO,
                    TRACTBL=16,
            *       TBSBPOOL=BP2,
            *       TBSBPLOB=BP40,
            *       TSQTY=720,
            *       URLGWTH=100,
            *       URCHKTH=1

        DSN6FAC *   DDF=AUTO,
                *   CMTSTAT=INACTIVE,
                *   IDTHTOIN=0,
                *   PRGSTRIN=DISABLE, (APAR PK46079)
                    RESYNC=2,
                    RLFERRD=NOLIMIT,
                    TCPALVER=YES
        DSN6GRP    DSHARE=NO,
                    GRPNAME=S4A,
                    MEMBNAME=DNX1,
                    COORDNTR=NO,
                    ASSIST=NO
        END
DSNHDECM CHARSET=ALPHANUM,
            *       ASCCSID=819,
                    AMCCSID=65534,
                    AGCCSID=65534,
            *       APPENSCH=EBCDIC,
            *       SCCSID=37,  ( or any value <= 640 and >= 700)
                    MCCSID=65534,
                    GCCSID=65534,
            *       ENSCHEME=ASCII,
                    DATE=ISO,
                    DATELEN=0,
            *       DECARTH=DEC15,
            *       DECIMAL=PERIOD,
                    DEFLANG=C,
                    DELIM=DEFAULT,
                    MIXED=NO,
                    SQLDELI=DEFAULT,
                    DSQLDELI=APOST,
                    SSID=DNX1,
                    STDSQL=NO,
                    TIME=ISO,
```

```
          TIMELEN=0
  END
```

XII   TCP/IP Connectivity

- required for SAP NetWeaver
- strategic communications protocol
- any HW supporting standard TCP/IP can be used
- ongoing enhancements are planned
- take advantage of standard TCP/IP functions:
     acknowledgement management
     re-transmission
     keep alive support
     in order delivery
- over GbE uses QDIO mode and MPC support which requires a VTAM TRLE Node
   Definition

TCP/IP Definitions:

Device: associates a TCP/IP device name with the LCS device number
       DEVICE <device_name> LCS <lcs_address>

Link: associates the TCP/IP link name with the network protocol attached to
     the port and the TCP/IP device name
       LINK <link_name> <network_protocol> <link_number> <device _name>

Home: associates the Home IP address with the link name
       HOME <home_ip_address> <link_name>

Gateway: associates the network address with the link name
       GATEWAY <network> <first_hop> <link_name> <max_packet_size>
           <subnet_mask>

Start: used to start the device name
       START <device_name>

XIII   Naming Conventions

1. The following elements should be part of an overall naming convention plan:

SAP SID	DR1
DB2 Started Task Names for MSTR, DBM1,DIST, IRLM	DR11MSTR
	DR11DBM1
	DR11IRLM
	DR11DIST
DB2 Member/Subsystem Name	DR11
DB2 SYSADM Userid	SAPINST
DB2 Group Attach Name	DR1
RRS Started Task Name	RRSD
TCP/IP Host Names	SAPD
TCP/IP DDF Port Numbers	
ICF Catalog Name	CATALOG.SAPDB2.xxxxx
High Level Qualifier For Dataset Names	DR1U for SAP Data
	DR1IC for DB2 Image Copies
	DR1 for DB2 Catalog,
	Directory,
	DR11 for System Libraries
	DR11 for DB2 Active Logs,
	Archive Logs, BSDS
SAP SMS Storage Groups	SGDR1CAT
	SGDR1LOG
	SGDR1ARC
	SGDR1SAP
	SGDR1IC
DB2 Connect Instance Name	DR1INST1
DB2 Connect Userid	DR1DB2C
DDF Location Name	DR1DDF
USS superuser (to run saposcol,sapccmsr)	DR1SUSER

2. For multiple mySAP.com components consider a naming convention such as:
   - First character identifies the type of system (e.g., development=D, production=P, quality assurance=Q, training=T, sandbox=S)
   - Second character identifies the component (e.g., R/3=R, BW=B, APO=A, EBP=E, CRM=C)
   - Third character is the system number or region:

   Example: DR1 is the first development R/3 system

              PR1 is the first production R/3 system

              QR1 is the first quality assurance R/3 system

              PB1 is the first production BW system

XIV   Application Server On z/OS Considerations

* Note that only the SAP Central Services ASCS and SCS are now supported on Unix System Services under z/OS *

1. The following OSS Notes should be reviewed:

>   595331 - z/OS enhanced ascii support & FTP updates
>   1009521 - Central Services does not start

2. Indicate at the time of the sizing that the central services instance will run on S/390 or z/OS, since this will affect the processing and memory requirements.

3. Review BPXPRMxx parameters, TCP/IP setup, and filesystem setup as documented in the *SAP Planning Guide for SAP NetWeaver for IBM DB2 UDB for z/OS* and the ASCS+SCS Installation Guide.

4. Disable SMF Record Type 92 (tracks HFS File activity).

5. Verify that the user exit IEFUSI is not limiting memory allocation for the central services instance startup.

XV   Sample OSA-Express GB Configuration

SYS1.VTAMLST(XXTRL)

```
XXTRL   VBUILD  TYPE=TRL
*
TRLEGBF8  TRLE  LNCTL=MPC,
                READ=600,WRITE=601,
                DATAPATH=602,
                PORTNAME=PORTGBF8,
                MPCLEVEL=QDIO
```

TCPIP.PROFILES(PROFILXX)

```
;OSA GIGABIT ETHERNET CHP F8 LG06
 DEVICE  PORTGBF8 MPCIPA NONROUTER
 LINK GIGAF8 IPAQGNET PORTGBF8

HOME
 10.1.1.254     GIGAF8


GATEWAY
;
; Direct Routes - Routes that are directly connected to my interface
; Network   First Hop   Link Name  Packet Size  Subnet Mask  Subnet VA
;
 10.0.0.0  =  GIGAF8   8992  0.255.255.0  0.1.1.0



  START PORTGBF8
```

OSA-Express Implementation Guide (SG24-5948-02)

XVI   DB2 Backup/Recovery Notes (OSS Note 83000)

NOTE: The procedures described here are applicable to DB2 Version 8. Version 8 provides two new utilities for backup and point in time recovery that provides a more robust solution that is less prone to errors, and reduces recovery time and labor time. These new utilities are described later in this section.

DB2 Backup

  - DB2 Image Copy
  - Volume Level (hardware assisted such as FlashCopy or DSS DASD Dump/Restore)

Database Recovery

  - to current end of log
  - to prior point in time represented by a log RBA
  - determined by business needs

DB2 Image Copy

  - Offline - not useful with R/3 in general
  - Online - used by almost all customers, used for recover to current

Volume Level

  - DB2 Suspend Log
  - FlashCopy/SnapShot/EMC TimeFinder
  - DB2 Resume Log
  - used as a base for prior point in time recovery

*Need to perform both types of backup, image copy:
  - allows recovery of individual tablespaces
  - allows management of the size of SYSLGRNX by deleting old image copies

Unit Of Recovery

- DB2 : does not span R/3 dialog steps, resolved at DB2 startup
- SAP: spans multiple dialog steps, uses VBLOG, resolved using transaction SM13 and parameter rdisp/vbreorg

Recover to Current
  - Standard DB2 Recovery
  - Recover damaged objects
  - RECOVER TABLESPACE/RECOVER INDEXSPACE
  - Image Copy + Apply Logs

Recover to prior point in time

  - A recovery of all tablespaces, indexspaces, DB2 catalog, and DB2 Directory to a previous log RBA (three ways to acomplish this)

  - <u>Conditional Restart to recover to any previous point in time using DB2 Image Copies</u>
   - Identify LOG RBA of prior point in time time: With DB2 V7 and the CHKFREQ parameter for controlling DB2 checkpoint time the recommendation is to set CHKFREQ at 15 minutes. That will ensure a days worth of checkpoints on the checkpoint queue in the BSDS, and will provide four RBAs / LRSNs every hour that can be used in the conditional restart.

   - Identify Tablespaces modified after the RBA to reduce the number of recovery jobs. Perform an analysis of the DB2 logs from the recovery RBA to the
current end of the log in order to minimize the number of objects to
be recovered. In this case recover the DB2 Catalog/Directory and
only those objects that are identified as a result of the analysis. Use REPORT
RECOVERY utility against all tablespaces or run DSN1LOGP SUMMARY
The best approach to identifying only the objects that need recovering is to analyze the archive logs that have been created between the two points-in-time. The recommendation is to put an automated process in place to analyze the archive logs as they are created, rather than waiting until a recovery situation arises.
The archive logs should be analyzed for all objects that have at least one of the following four message numbers, indicating a change to the object.
--DSN1151I,
--DSN1152I,
--DSN1160I,
--DSN1162I.

  - STOP DB2
  - Save the BSDS and log datasets after the target RBA
  - Build DB2 Conditional Restart Rceord using DSNJU003 with ENDRBA=target RBA
  - Update ZPARMS to set DEFER=ALL, Restart DB2
  - Recover DB2 Catalog and Directory to current point in time. Refer to the Utility
Guide, Chapter on RECOVER; Instructions for Specific Tasks; Recovering catalog
and directory objects.
  - all user indexes on the catalog and directory
  - Recover R/3 Tablespaces and Indexspaces identified above to current point in time
  - Stop DB2
  - Update ZPARMS to reset DEFER parameter
  - Perform Full Offline Backup
  - Restart DB2
  - Use transaction SM13 to resolve R/3 units of work (business transactions)

- Recover to a prior point in time corresponding to the time of FlashCopy
    - Reset volumes using FlashCopy, including BSDS and logs
    - Restart DB2
    - Use transaction SM13 to resolve R/3 units of work

 - Recover to a prior point in time using FlashCopy + logs

    - Reset volumes using FlashCopy , but use current BSDS and active logs.
Use CHKFREQ of 15 minutes to keep at least a day worth of checkpoints in the current
BSDS. Make the active log configuration large enough to hold all log records written
between FlashCopy.
Example: FlashCopy every 12 hours. Make sure the same active log data set is not
being reused within 12 hours.

    - Requires archive logs from point of FlashCopy
       (If the active log configuration is large enough, then archives won't be required).

    - Follow the same steps for Conditional Restart, except specify the LOGONLY option
on the RECOVERY commands

    - If using volume-level-copies to re-establish the date and time of the data
(automatically assumes data is being regressed) and then coming forward on the log,
the two points-in-time are; A.) The RBA/LRSN of the log suspend, or consistency
group, when the volume-level-copy was taken, and B.) The point-in-time to which the
database is to be reset to (coming forward on the log, but not all the way to current).

    - Use transaction SM13 to resolve R/3 units of work

 - Disaster Recovery

    - point in time copies, send offsite
    - DB2 image copies, send offsite
    - disk to disk remote copy mirroring, PPRC, XRC

DB2 Version 8 Enhancements

DB2 Version 8 enhances the SAP backup and recovery process by providing two new system utilities for system level backup and a point in time recovery for the entire SAP system. These are the BACKUP SYSTEM and RESTORE SYSTEM. They provide an efficient and non-dusruptive method for backing up the entire SAP database. DFSMS has new entities that provide support for these utilities, these are the Copy Pool construct and the Copy Poolbackup Storage Group type. Reference the redbook *DB2 UDB for z/OS V8: Through the Looking Glass and What SAP Found There (IBM SG24-7088)* for additional information.

The requirements for implementing these utilities are:

 - DB2 V8 in New Function Mode
 - DASD that supports the FlashCopy API
 - z/OS 1.5 or higher
 - DFSMS Managed DB2 DataSets
 - Copy Pools for data and logs
 - Backup Storage Groups for each Storage Group in a Copy Pool

The high level steps for performing a backup/recovery are:

 - Use the DFSMS ISPF Panels to define the Copy Pool, Source Storage Group, and
   Backup Storage Group structures
 - Execute the BACKUP SYSTEM Utility
 - Use the DB2 Quiesce Utility on a dummy object to establish and document a
    recovery point (RBA for non-Data Sharing, LRSN for Data Sharing)
 - Execute DSNJU003 Utility to create a conditional restart control record for system
    point in time recovery (for Data Sharing execute for each member)
 - Restart DB2 (system is in System Recover Pending Mode, if Data Sharing restart all
    members))
 - Execute the RESTORE SYSTEM Utility
 - DB2 recovers the system to the specified point in time
 - Recover or rebuild objects DB2 placed in a recover pending state
 - Restart DB2 (if Data Sharing all members) to reset the system recovery pending
    status

XVII SAP Automation And High Availability Solution

1. The following OSS Notes should be reviewed:

> 569996 (Redbook Updates)
> 524816

2. Indicate at the time of the sizing that the SAP Central Services instance will run on z/OS, since this will affect the processing and memory requirements.

3. The following IBM Manuals provide detailed implementation of the High Availability Solution:

> SAP On DB2 UDB For OS/390 And z/OS: High Availability Solution Using System Automation (SG24-6836-00)

> High Availability for SAP on zSeries Using Autonomic Computing Technologies (SC33-8206)

4. The following software is required for the HA Solution on z/OS:

 - z/OS V1.6 or later
 - DB2 UDB For z/OS V8.1
 - Tivoli Netview for z/OS (5697-ENV)
 - Tivoli Systems Automation for zSeries (5645-006 MLC, 5698-A14 OTC)
 - Tivoli Systems Automation for Linux for zSeries (z/Linux Central Services instance)
 - SAP Central Services Server (installed via SAPinst)

5. IBM offers a System Automation for z/OS Implementation Quick Start service.

6. The File Handle Database used by the NFS Server (DDNAME FHDBASE) must be shared between the failing LPAR and the failover LPAR.

XVIII SAP Application Server on zLinux Considerations

1. Review the latest version of OSS Note 81737 for the supported Linux distribution.

2. Hardware requirements:
   - IBM eServer zSeries z800, z900, z990, z890, z9, z9 BC, z9 EC
   - Each Linux image requires disk space for boot and swap(20GB)
   - Minimum 512 MB Central Storage

3. Software requirements:
   - DB2 UDB for z/OS Version 8.1 or DB2 9
   - z/VM 4.4 or higher (z/VM 5.3 is highly recommended)
   - a 64 bit Linux distribution with glibc 2.2.4 and kernel 2.4.x is required.
   - TCP/IP is the supported communication protocol
   - NLS locales de_DE, en_US
   - NFS
   - C-Development Package
   - PTF Requirements are in OSS Note 81737

4. Review the TCP/IP Connectivity Requirements starting on page 38 of the manual
SAP R/3 on DB2 for OS/390 and z/OS Connectivity Guide SC33-7965-03.

5. OSS Notes:

   81737   DB2/390 APAR List
   563060   DB2/390: Kernel Parameter for Linux on zSeries
   386605   SAP Memory Management for zSeries

6. Documentation:
   SAP on DB2 UDB for OS/390 and z/OS: Implementing Application
      Servers on Linux for zSeries (SG24-6847-00)

   SAP R/3 Installation on Linux for zSeries : IBM DB2 UDB for OS/390 and z/OS

   Linux for IBM eServer zSeries and S/390: Distributions (SG24-6264-00)

   Linux on IBM eServer zSeries and S/390: ISP/ASP Solutions (SG24-6299-00)

   Linux for S/390 (SG24-4987-00)

   Linux on zSeries and S/390: Systems Management (SG24-6820-00)

   Additional Notes for installing SAP R/3 4.6 and up on the Linux Enterprise
      Server 8 for zSeries
      (ftp.suse.com/pub/projects/sap/SLES8/zSeries/SAP-en.pdf)

7. Recommendations from the joint IBM/SAP Platform Team:

✓   Always use the latest z/VM release available , currently z/VM 5.3
✓ Apply z/VM 5.1 APAR 63636 (PTF UM31312)
✓ Apply all z/VM APARs listed in OSS Note 81737
✓ Additional z/VM Considerations (these are specific to the customer configuration and the workload characteristics) :
  - Consider HiperSockets , Vdisk, Vlan for network/swapping optimization
  - Consider workload distribution techniques such as add/reduce CPUs dynamically as LPAR load changes and distribute workload over day/night/weekend
  - Disable unused Linux guests to eliminate resource consumption (memory, CPU)
  - Limit number of CPUs per Linux guest to reduce overhead cycles for unused CPUs
  - Use FCP/SCSI devices instead of FICON/ECKD or ESCON to improve throughput
  - Use Quick Dispatch for dialog intensive Linux guests to improve response time
  - Review possible overcommitment of memory to avoid paging in z/VM
✓ Apply the Fixed I/O Buffers Fix (SLES 9 SP1) available at
    http://www.128.ibm.com/developerworks/linux/linux390/perf/tuning_rec_fixed_io_buffers.html
✓ For additional fixes and tuning hints please see:
    http://www.128.ibm.com/developerworks/linux/linux390/index.html
✓ Use multiple swap volumes to avoid I/O bottlenecks.
✓ Always use the latest available Linux kernel (currently SLES 10 SP1)
✓ Configure swap volumes on the disk subsystem so that multiple channels are used. If for example 15 of the 2.3 GB logical swap volumes are being mapped to a single 72 GB physical drive the throughput rate will be low.
✓ FICON can support more swap volumes than channels. For example if you are using 8 FICON channels then define 16-24 swap devices.
✓ In Linux set the priority equal for all swap volumes.
✓ Minimize paging and swapping. Define the Linux guests as small as possible without having Linux swapping occur on a regular basis.
✓ If using extended memory for z/VM avoid paging in and out of extended memory.
✓ Do not use z/VM TCP/IP as an IP router, this results in high CPU consumption.
✓ Do not use MDC for SAP, this will conserve memory.
✓ Tune the number of SAP work processes using SAP transaction SM50 or SM66.
✓ For the HiperSocket definition to the DataBase LPAR use an MTU size of 16K or larger.

XIX   Sample SMS Storage Group Assignments

1. Here is a sample assignment methodology for setting up SMS Storage Groups. One recommendation is to name the storage groups starting with the 3 character SAP <SID> followed by the type of dataset.

STORAGE GROUP Name	Dataset Type	Sample Name (<SID>=DR1)
LOG	DB2 Active Log Datasets/BSDS/ ICF Catalog for Active Logs, BSDS, Archive Logs	SGDR1LOG
ARCH	DB2 Archive Log Datasets	SGDR1ARC
CAT	DB2 Catalog/Directory/DSNDB07/ DB2 System Libraries, ICF Catalog for Catalog, Directory, System Libraries	SGDR1CAT
DATA	SAP Tablespaces/Indexspaces, ICF Catalog for SAP Tablespaces/ Indexspaces	SGDR1SAP
COPY	DB2 Image Copies, ICF Catalog For Image Copies	SGDR1IC
(WORK	DSNDB07	SGDR1WK)

ICF Catalog Names:

        CATALOG.SAPDB2.DR1LOG
        CATALOG.SAPDB2.DR1USR
        CATALOG.SAPDB2.DR1DB2
        CATALOG.SAPDB2.DR1IC

Catalog Structure:

Catalog	Alias	ACS Dataset Name
DR1USR	DR1U	DR1U.*
DR1IC	DR1IC	DR1IC.**
DR1DB2	DR1	DR1.SRCLIB DR1.DBRMLIB DR1.RUNLIB.LOAD DR1.DSNDB*.DSN*.**
	DR11	DR11.DSN*
DR1LOG	DR11.LOGCOPY1	DR11.LOG*.**
	DR11.LOGCOPY2	DR11.BSDS*
	DR11.BSDS01	DR11.ARCHLOG*
	DR11.BSDS02	
	DR11.ARCHLOG1	
	DR11.ARCHLOG2	

+ System related storage groups:

SYS	System Datasets
PAGE	Page Datasets
SORT	Sort Datasets
SOFTW	Software Library Datasets
HFS	USS HFS Datasets

 2. For implementation of the new DB2 V8 and DB2 9 utilities BACKUP SYSTEM and RESTORE SYSTEM, DB2 requires two SMS Copy Pools: DSN$location-name$DB for data (DB2 Catalog, DB2 Directory, SAP data) and DSN$location-name$LG for log data (DB2 Logs, BSDS, and DB2 Load Libraries). The appropriate SMS Storage Groups need to be assigned to the correct Copy Pool. Each pool requires a separate ICF Catalog.